

L Number	Hits	Search Text	DB	Time stamp
1	1	("6403442").PN.	USPAT; US-PGPUB	2003/04/08 15:50
2	1172	capacitor and HSG	USPAT; US-PGPUB	2003/04/08 16:20
3	1092	(capacitor and HSG) and (opening or recess or hole or trench or via or container)	USPAT; US-PGPUB	2003/04/08 16:23
4	587	((capacitor and HSG) and (opening or recess or hole or trench or via or container)) and @ad<=19990902	USPAT; US-PGPUB	2003/04/08 16:24

L Number	Hits	Search Text	DB	Time stamp
1	465	HSG and ((opening or via or recess or hole) with (filler or filling or photoresist or resist or polymer))	USPAT; US-PGPUB	2003/04/09 14:31
2	402	(HSG and ((opening or via or recess or hole) with (filler or filling or photoresist or resist or polymer))) and capacitor	USPAT; US-PGPUB	2003/04/09 14:16
3	216	((HSG and ((opening or via or recess or hole) with (filler or filling or photoresist or resist or polymer))) and capacitor) and @ad<=19990902	USPAT; US-PGPUB	2003/04/09 14:37
4	27	HSG and ((opening or via or recess or hole) with (filler or filling or photoresist or resist or polymer))	EPO; JPO; DERWENT; IBM_TDB	2003/04/09 14:30
5	3266	438/396,398,253,255,666.ccls.	USPAT; US-PGPUB	2003/04/09 14:44
6	638	438/396,398,253,255,666.ccls. and HSG	USPAT; US-PGPUB	2003/04/09 14:46
7	396	(438/396,398,253,255,666.ccls. and HSG) and @ad<=19990902	USPAT; US-PGPUB	2003/04/09 14:46
8	246	((438/396,398,253,255,666.ccls. and HSG) and @ad<=19990902) not (((HSG and ((opening or via or recess or hole) with (filler or filling or photoresist or resist or polymer))) and capacitor) and @ad<=19990902)	USPAT; US-PGPUB	2003/04/09 14:37
9	1373	257/306-309.ccls.	USPAT; US-PGPUB	2003/04/09 14:46
10	179	257/306-309.ccls. and HSG	USPAT; US-PGPUB	2003/04/09 14:46
11	99	(257/306-309.ccls. and HSG) and @ad<=19990902	USPAT; US-PGPUB	2003/04/09 14:47
12	76	((257/306-309.ccls. and HSG) and @ad<=19990902) not (((438/396,398,253,255,666.ccls. and HSG) and @ad<=19990902) not (((HSG and ((opening or via or recess or hole) with (filler or filling or photoresist or resist or polymer))) and capacitor) and @ad<=19990902))	USPAT; US-PGPUB	2003/04/09 14:47

US-PAT-NO: 6207523

DOCUMENT-IDENTIFIER: US 6207523 B1

TITLE: Methods of forming capacitors DRAM
arrays, and
monolithic integrated circuits

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forming a solid mass of silicon material filling an opening formed over a node location defined by a doped region of the semiconductor substrate, the mass comprising exposed doped silicon and exposed undoped silicon in contact with one another, and including undoped silicon in physical contact with the node location;

forming a solid mass comprising two forms of silicon filling the opening and in contact with one another, the two forms of silicon together forming a capacitor storage node, the two forms of silicon including undoped silicon in physical contact with the node location;

forming a solid mass of silicon material filling the opening, the silicon material comprising doped silicon and undoped silicon in contact with one another and defining a capacitor storage node, a portion of the undoped silicon being in physical contact with the node location;

forming a doped silicon layer within the narrowed opening and in contact with the undoped silicon layer, the undoped silicon layer and doped silicon layer together filling the opening and defining a capacitor storage node;

forming a second undoped silicon layer within the further narrowed opening and in contact with the doped silicon layer; the first undoped silicon layer, second undoped silicon layer and doped silicon layer together filling the opening and defining a capacitor storage node;

filling the opening with silicon material, the silicon material comprising doped silicon and undoped silicon and defining a capacitor storage node, the undoped silicon being in contact with the node location;

29. The method of claim 26 wherein filling the opening with silicon material comprises forming a layer of doped polysilicon within a layer of undoped substantially amorphous silicon.

filling the narrowed opening with a doped silicon layer, the undoped silicon layer and doped silicon layer together defining a capacitor storage node;

filling the opening with doped silicon;

filling the opening by forming the solid core of doped silicon within the opening, the doped silicon being separated from the node location by the undoped silicon.

	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Document ID	Issue Date	Pages	Title	Current OR
1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 20020031895 A1	20020314	24	METHOD TO REDUCE FLOATING GRAIN DEFECTS IN DUAL-SIDED CONTAINER CAPACITOR FABRICATION	438/396
2	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 20020020866 A1	20020221	8	METHOD FOR MANUFACTURING A CAPACITOR HAVING A TWO-LAYER LOWER ELECTRODE	257/301
3	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 20020017674 A1	20020214	12	CAPACITOR STRUCTURE	257/306
4	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 6340613 B1	20020122	6	Structural integrity enhancement of dielectric films	438/240
5	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 6333241 B1	20011225	8	Method for fabricating capacitor of semiconductor memory device	438/398
6	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 6326277 B1	20011204	14	Methods of forming recessed hemispherical grain silicon capacitor structures	438/398
7	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 6323514 B1	20011127	8	Container structure for floating gate memory device and method for forming same	257/315
8	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 6319789 B1	20011120	23	Method for improved processing and etchback of a container capacitor	438/396

	Current XRef	Retrieval Classif	Inventor	S	C	P	2	3	4	5	Image Doc. Displayed	PT
1	438/255; 438/398		PING, ER-XUAN	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 20020031895	<input type="checkbox"/>
2			LEE, JOO-WON et al.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 20020020866	<input type="checkbox"/>
3			ROBERTS, MARTIN CEREDIG et al.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 20020017674	<input type="checkbox"/>
4	257/E21.267; 438/786; 438/787		DeBoer, Scott J.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 6340613	<input type="checkbox"/>
5	257/E21.013; 438/255		Kim, Hyeon-Soo	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 6333241	<input type="checkbox"/>
6	257/E21.013; 438/238		DeBoer, Scott J.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 6326277	<input type="checkbox"/>
7	257/316; 257/317; 257/318; 257/323; 257/E29.129; 438/211; 438/257		Kao, David Y.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 6323514	<input type="checkbox"/>
8	257/E21.019; 430/316; 430/317; 438/244; 438/253; 438/387; 438/638; 438/675; 438/723		Carstensen, Robert K.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 6319789	<input type="checkbox"/>

	U	¹ [1 J]	Document ID	Issue Date	Pages	Title	Current OR
9	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 6303953 B1	20011016	13	Integrated capacitor bottom electrode with etch stop layer	257/296
10	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 6303430 B1	20011016	13	Method of manufacturing DRAM capacitor	438/253
11	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 6281543 B1	20010828	12	Double layer electrode and barrier system on hemispherical grain silicon for use with high dielectric constant materials and methods for fabricating the same	257/309
12	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 6281142 B1	20010828	16	Dielectric cure for reducing oxygen vacancies	438/771
13	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 6258691 B1	20010710	24	Cylindrical capacitor and method for fabricating same	438/398
14	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 6258664 B1	20010710	8	Methods of forming silicon-comprising materials having roughened outer surfaces, and methods of forming capacitor constructions	438/255

	Current XRef	Retrieval Classif	Inventor	S	C	P	2	3	4	5	Image Doc. Displayed	PT
9	257/301; 257/309; 257/532; 257/E21.019; 257/E29.343		Doan, Trung T. et al.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 6303953	<input type="checkbox"/>
10	257/E21.019; 438/254; 438/255; 438/396; 438/397; 438/398		Jenq, J. S. Jason	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 6303430	<input type="checkbox"/>
11	257/310; 257/E21.013; 438/240; 438/255		Al-Shareef, Husam N. et al.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 6281543	<input type="checkbox"/>
12	257/103; 257/236; 257/240; 257/310; 257/E21.009; 257/E21.241; 322/10; 438/240; 438/402; 438/404		Basceri, Cem et al.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 6281142	<input type="checkbox"/>
13	257/E21.012; 257/E21.648		Kim, Yun-Gi	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 6258691	<input type="checkbox"/>
14	257/E21.013; 438/398; 438/491		Reinberg, Alan R.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 6258664	<input type="checkbox"/>

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15	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 6255159 B1	20010703	13	Method to form hemispherical grained polysilicon	438/253
16	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 6251742 B1	20010626	11	Method of manufacturing a cup-shape capacitor	438/396
17	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 6235571 B1	20010522	8	Uniform dielectric layer and method to form same	438/240
18	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 6211033 B1	20010403	10	Integrated capacitor bottom electrode for use with conformal dielectric	438/387
19	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 6187629 B1	20010213	9	Method of fabricating a DRAM capacitor	438/255
20	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 6159793 A	20001212	8	Structure and fabricating method of stacked capacitor	438/255
21	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 6159785 A	20001212	21	Semiconductor device and manufacturing method thereof	438/238
22	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 6146961 A	20001114	18	Processing methods of forming a capacitor	438/396

	Current XRef	Retrieval Classif	Inventor	S	C	P	2	3	4	5	Image Doc. Displayed	PT
15	257/E21.012; 257/E21.648; 438/254; 438/255; 438/396; 438/397; 438/398		Thakur, Randhir P. S.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 6255159	<input type="checkbox"/>
16	257/E21.019; 257/E21.578		Lin, Yeh-Sen	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 6251742	<input type="checkbox"/>
17	257/E21.008; 257/E21.293; 438/3; 438/396; 438/769		Doan, Trung	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 6235571	<input type="checkbox"/>
18	257/E21.008; 257/E21.012; 257/E21.648; 438/244; 438/253		Sandhu, Gurtej S. et al.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 6211033	<input type="checkbox"/>
19	257/E21.013; 438/253; 438/396; 438/398		Gau, Jing-Horng et al.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 6187629	<input type="checkbox"/>
20	257/E21.013; 257/E21.019; 438/964		Lou, Chine-Gie	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 6159793	<input type="checkbox"/>
21	257/E21.013; 438/253; 438/254		Tsuchimoto, Junichi et al.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 6159785	<input type="checkbox"/>
22	257/E21.014; 257/E21.019; 257/E21.648; 257/E27.089; 438/253		Graettinger, Thomas M. et al.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 6146961	<input type="checkbox"/>

	U	¹ [1]	Document ID	Issue Date	Pages	Title	Current OR
23	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 6126847 A	20001003	8	High selectivity etching process for oxides	216/57
24	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 6124607 A	20000926	11	Capacitive memory cell	257/309
25	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 6110774 A	20000829	11	Method of forming a bit line over capacitor array of memory cells and an array of bit line over capacitor array of memory cells	438/253
26	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 6049101 A	20000411	13	Processing methods of forming a capacitor, and capacitor construction	257/296
27	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 5960294 A	19990928	10	Method of fabricating a semiconductor device utilizing polysilicon grains	438/398
28	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 5930641 A	19990727	11	Method for forming an integrated circuit container having partially rugged surface	438/398
29	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 5801413 A	19980901	13	Container-shaped bottom electrode for integrated circuit capacitor with partially rugged surface	257/301
30	<input type="checkbox"/>	<input checked="" type="checkbox"/>	US 5409855 A	19950425	10	Process for forming a semiconductor device having a capacitor	438/253

	Current XRef	Retrieval Classif	Inventor	S	C	P	2	3	4	5	Image Doc. Displayed	PT
23	257/E21.008; 257/E21.219; 257/E21.251; 257/E21.252		Thakur, Randhir et al.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 6126847	<input type="checkbox"/>
24	257/296; 257/308; 257/E21.012		Sandhu, Gurtej Singh et al.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 6124607	<input type="checkbox"/>
25	257/E21.011; 438/397		Jost, Mark et al.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 6110774	<input type="checkbox"/>
26	257/301; 257/308; 257/E21.019; 257/E21.648; 257/E27.089		Graettinger, Thomas M. et al.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 6049101	<input type="checkbox"/>
27	257/E21.013; 438/255		Zahurak, John K. et al.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 5960294	<input type="checkbox"/>
28	257/E21.011; 257/E21.012; 257/E21.648; 438/255		Pan, Pai-Hung	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 5930641	<input type="checkbox"/>
29	257/303; 257/308; 257/309; 257/534; 257/E21.011; 257/E21.012; 257/E21.648; 361/303		Pan, Pai-Hung	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 5801413	<input type="checkbox"/>
30	257/E27.089; 438/254; 438/396; 438/397; 438/620		Jun, Young-Kwon	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	US 5409855	<input type="checkbox"/>